2014-04

CRUSER Technical Continuum

Monterey, California: Naval Postgraduate School

http://hdl.handle.net/10945/49840

CRUSER Events

CRUSER sponsors several events in support of our yearly innovation thread.

2016_09 Warfare Innovation Workshop

2016_07 CRUSER TechCon

2016_05 CRUSER Expo 2016

2016_04 Robots in the Roses

2016_03 RoboEdu

2015_09 Warfare Innovation Workshop

2015_04 TechCon

2015_04 Robots in the Roses

2015_04 Robo Ethics

2015_03 Warfare

2014_04 TechCon

CRUSER Technical Continuum

Details

Where & When

- **Date:** 8-9 April 2014
- **Time:** 0900 - 1400 each day -
- **Location:** NPS Ingersoll Plaza
- Abstract Submission Information
- **Abstracts Due:** 15 March 2014

Contact

CRUSER

Description

CRUSER's annual NPS TechCon provides NPS Faculty an opportunity to explore selected concepts in support of our 3rd Innovation Thread - “Distributing Future Naval Air and Surface Forces.”

The selected concepts were developed during the September Warfare Innovation Workshop 2013 and the March 2013 Warfare Innovation Workshop “Advancing Undersea Warfare.”

Innovation Workshop
2015_03 CRUSER Colloquium
2015_01 CRUSER Colloquium
2014_09 Warfare Innovation Workshop
2014_05 Mine Warfare Symposium
2014_05 CRUSER Tech Expo
2014_04 TechCon
2014_04 Robots in the Roses
2014_03 RoboEthics
2013_09 Warfare Innovation Workshop
2013_09 RoboEthics
2013_04 TechCon
2013_04 Robots in the Roses
2013_03 Warfare Innovation Workshop
2012_10 Fleet Week
2012_09 Warfare Innovation Workshop
2012_05 TechCon
2012_05 Robots in the Roses
2012_01 RoboEthics
2012_01 CRUSER

Although the concepts below have been highlighted, presentations may be about any concept related to the Innovation Thread.

20 minute presentations will allow faculty to showcase how they can take a concept to experimentation.

Call for Abstracts

CRUSER's annual NPS TechCon provides NPS Faculty an opportunity to explore selected concepts in support of our 3rd Innovation Thread - “Distributing Future Naval Air and Surface Forces.”

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Abstracts are due by 15 March to CRUSER@nps.edu

Additional Details about Selected Concepts

Natural low frequency search methods: leverage the earth’s natural electro-magnetic spectrum for search based on receiving anomalies caused by man- made platforms as they disturb various fields and emissions. Further details of this concept are classified and available through appropriate channels.

Re-seeding energy: Induction transfer of energy to large diameter UUV (LDUUV) payload, and LDUUV induction to fielded sensors. This concept aims to leverage the enormous power generation capabilities of the SSN to provide a

Lecture

2011_11 CRUSER Lecture

2011_09 Warfare Innovation Workshop

2011_08 CRUSER Lecture

2011_03 Robots in the Roses

persistent energy source to a range of fielded sensors and assets. Two of the driving needs to use induction as the transfer mechanism are to eliminate the need for physical contact (expensive and complicated wet-mates) and to enable re-charging while underway.
Using UUVs to aid in submarine minefield navigation: Named undersea “Sled Dogs”, or “Cat Whiskers” this concept uses a “dynamic Q route” using Q from the stochastic model and employs two ROVs traveling ahead of the submarine with integrated sensors. The ROVs could have acoustic sensors to help augment the submarine's 3D spatial awareness, dedicated mine detecting sensors, and a communications suite. Traveling at a relatively low speed (2-5 knots) the ROV would receive power and control through the tether with the submarine. The complement of sensors on the ROV could either be locally analyzed or sent back to the submarine for computational analysis. In the case that a mine was discovered and had to be disposed of, the ROV could cut its tether and continue under its own power to defuse the threat.

Wide area decoy: surface launched drone deployment using many inexpensive gliders (“flocks”) deployed from LDUUV via a balloon to altitude – add reflectors to confuse adversary. The best way to create a cost imposing strategy on the adversary is to create an inexpensive means to disable their expensive, high value capability. China has created the DF-21D which costs approximately $1 million to sink U.S. aircraft carriers which cost $13.5 billion. The crux for any missile system is its radar targeting system. If one was to deploy a large swarm, 100-1,000 inexpensive UAVs with radar jamming capabilities, it would render the missile system inoperable. A new counter measure would have to be developed to disable the

swarm of cheap, hard to target UAVs. A potential launching method for the UAV is to passively deploy it from an LDUUV. Instead of requiring a forceful launching mechanism, the UAV could be attached to a self-inflating balloon that would lift the UAV to a designated altitude the drop the UAV. The UAV will reach a terminal velocity to begin flying under its own propulsion.

It is expected that in the 2030 time frame, the first 300 feet in the water column will become transparent to overhead sensors. In an effort to counteract this transparency, a radar/EM reflecting substance could be released onto the surface of the littorals. This reflecting layer would give undersea assets operating impunity from overhead sensors.

Asset Distribution and Employment Concepts:

Surface Flotilla with Expeditionary Basing and Optionally Manned Ship – use of a combined manned and unmanned flotilla of surface ships to add dispersed offensive capability to the fleet. The flotilla is supported using a logistics network composed of mobile bases and small combat support ships

Subsurface Flotilla with Semi-Submersible Platforms – similar to the surface flotilla, this concept uses smaller conventional submarines and semi-submersible ships to increase individual platform survivability

Distributed Expeditionary Airbase Concept – aka ships as “Lily Pads” with distributed shore basing

Dissimilar Swarm Autonomy – warfighting UxS element to consider is not the individual platform, but a flexible mix/system/group;

swarm has preset queuing/signals; semi-autonomy, flexible autonomy, leader-election algorithm, stigmergic communication

Autonomous Coordinated UxS Maneuvers for Sensor Positioning – collaborative and autonomous unmanned sensor positioning to allow for passive target locating and tracking; UxS "swarm" behavior that automatically repositions passive sensors to locate, identify, and track targets of interest

UAV Payloads to Augment Strike Capabilities– decoy/MILDEC is an important payload for this concept

C2/3 Concepts:

Wave-Gliders for Cueing and C3 Networks – get wave-gliders to operate in pairs the groups as passive receivers; triangulate receipt of signals until they reach a targeting solution, and then transmit

Virtual Crow's Nest – use of lighter-than-air platforms to provide tethered sensors

Full Network Deployment– view full system as the combat power so make a concentrated effort to integrate C2 across domains throughout the network of combat platforms – "intercommunicatedness"

Leverage Ambient Signals – use ambient transmission signals (TV, radio, Faruno commercial radar, etc.) to navigate and for targeting to remain "silent"

C2 for Hunter-Killer Mindset – re-emphasize offensive capabilities, as offensive warfare is easier and weaponry is less expensive than defending assets in the field.

UAV "Carrier Pigeon" – using UAVs to pass messages with hard copy payloads, or line of sight communications, i.e. TERN could cover 900NM between surface forces

UxS C2 Modification – How will C2 concepts need to be modified to allow large numbers of less capable systems to operate while human systems are at EMCON ALPHA

Strategic UxS C2, force allocation, and Employment– use UxS for pre-decisional preplanned mission assignments, leaving manned assets available for flexible decision missions

Biologically Encoded Acoustic Communication – i.e. snapping shrimp or whale song; embed signal in white noise that requires a "key" to find the pattern

IR "Bat Signal"– ionosphere IR reflection signal

Innovative C3 Systems for Distributed Manned and Unmanned Platforms and Systems – use of autonomy, command by negation, and distributed communications to provide new C3 systems

Deception and Weather Concepts:

Sea Chaff or Sea Flare – use of sea surface to host EIO and IR decoys

Disruptive Swarm – robotic fish, or guide the fish away en masse

Weather Weapons – creating weather for non-military applications, but have not yet used it to aid a military mission

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